

A REVIEW OF THE GENUS *DOIRANIA* WATERSTON (HYMENOPTERA:  
TRICHOGRAMMATIDAE), WITH A DESCRIPTION OF A NEW SPECIES  
FROM NORTH AMERICA

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*Abstract.*—The trichogrammatid genus *Doirania* is reviewed. The genus, previously known only from species in Japan and New Guinea, has a considerably more widespread distribution which includes North America and other areas of the Palaearctic. Three species are assigned. The North American species (*D. elegans*, n. sp.) is described and compared to congeners. The limits of *Doirania* and its relationship to other members of the tribe Oligositini are discussed.

*Key Words:* Hymenoptera, Trichogrammatidae, *Doirania*, taxonomy

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As is the case with most trichogrammatid genera, *Doirania* is uncommonly collected and poorly known. It was described by Waterston (1928) for a single species, *D. leafmansi*, a parasite in eggs of Tettigoniidae (Orthoptera), from Ambon, Indonesia. A second species, *D. longiclavata* Yashiro, from Japan, was added in 1980. Recent collections show the genus to be considerably more widespread. This paper presents a brief review of the genus and the description of an additional species, *D. elegans*, which is widespread in eastern North America.

*Doirania* is assigned to the tribe Oligositini (Viggiani 1971). It has been considered close to *Oligosita* (Doutt and Viggiani 1968, Yashiro 1980), and possibly deserving only subgeneric status (Viggiani 1971). The primary feature separating the two genera historically is antennal club segmentation (one in *Doirania*, two or three in *Oligosita*). Although additional traits separating these taxa are proposed here, generic limits remain questionable, and certain species currently assignable to *Oligosita* ap-

pear to be closer to *Doirania*. The current definition of *Doirania* is retained pending a complete evaluation of oligositine relationships.

Terminology employed for most morphological traits follows Doutt and Viggiani (1968) and Gibson (1989, 1997). Terms for antennal sensilla follow Olson and Andow (1993), and Pinto (1999).

*Doirania* Waterston

*Doirania* Waterston 1928: 386. Type species: *Doirania leafmansi* Waterston 1928, original designation. Doutt and Viggiani 1968: 499; Viggiani 1971: 208; Hayat and Subba Rao 1985: 241, 304; Pinto 1997: 773.

*Diagnosis.*—Ranging from 0.4–0.8 mm in length; color light to dark brown. *Head:* Foramen magnum near top of head, at or above level of dorsal margin of eyes (Fig. 1). Antennal formula (Fig. 4): 2 anelli (2nd anellus discoid, inconspicuous), funicle 1-segmented, club 1-segmented; funicle well separated from club, transverse; club with 6 placoid sensilla (2 at middle and 4 api-

cally), with at most 1 or 2 unsocketed setae, these at extreme base when present; length of scape and pedicle combined greater than that of flagellum. *Mesosoma*: Finely etched longitudinal line present medially on scutum and scutellum (correlated with a white line visible in dried specimens). Mesopleuron without a pleural suture. Venter of mesothorax with distinct transepisternal sulci (see Gibson 1989). Forewing (Fig. 15) 2.5–3× as long as wide; longest fringe setae length ca.  $\frac{1}{2}$ – $\frac{2}{3}$  greatest wing width. *Metasoma*: At least the anterior 3 terga longitudinally striate posteriorly (Figs. 13, 14). Two or more metasomal sterna completely divided longitudinally and ovipositor short, not extending beyond apex of metasoma or only slightly so (Figs. 8, 9). Male with a relatively broad, apically truncate ventromedial projection on antepentultimate sternum (Fig. 10). Male genitalia simple, as in several other oligositine genera, reduced to a single tube with two short apodemes at base (Figs. 10, 16, 17).

Remarks.—The Oligositini are recognized by features of the male genitalia (Viggiani 1971) as well as by the black rather than red compound eyes and the presence of one instead of two pair of setae each on the scutum and scutellum (Fig. 7). Genera assigned to the tribe in addition to *Doirania* include *Oligosita*, *Megaphragma*, *Prestwichia*, *Epoligosita*, *Prosoligosita*, *Chaetotrichella*, *Hayatia*, *Eteroligosita*, and *Probrachista*. De Santis (1997) also assigned his new genus *Brachistagrapha* to this tribe but, known only from females, its placement requires confirmation.

*Doirania* is separated from all other oligositine genera by the following combination of characters: Foramen magnum placed near top of head (Fig. 1); antenna (Fig. 4) with a single club segment and a transverse funicle; three or more metasomal terga with a longitudinally striate posterior section (Figs. 13, 14); ovipositor relatively short, not extending beyond apex of metasoma; male genitalia simple (Figs. 16, 17), tubular, without complex apodemes basally. Certain

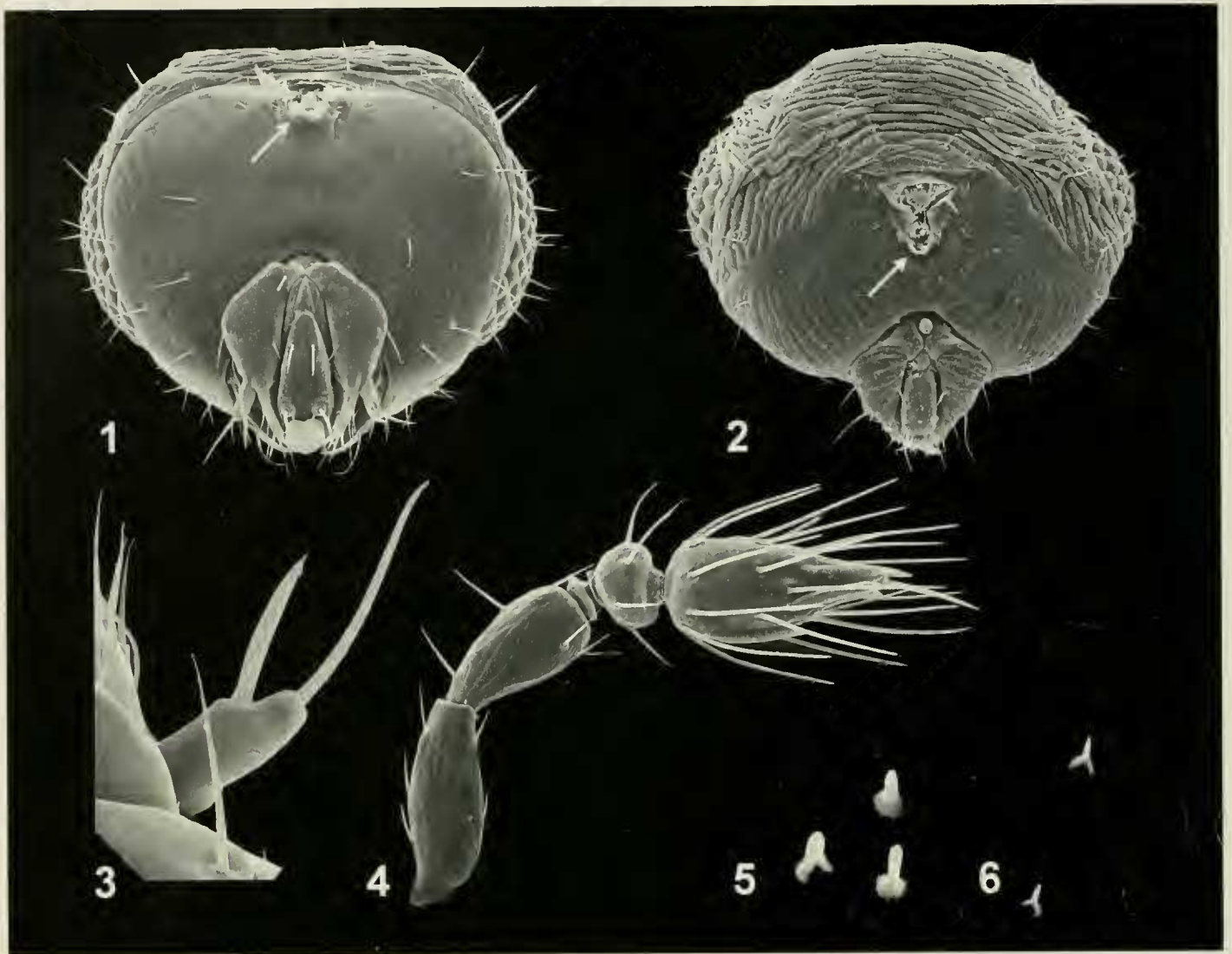
species of *Epoligosita* also have a one-segmented club (Doutt and Viggiani 1968) but in that genus, as in other oligositines, the foramen is placed near the middle of the head (Fig. 2), much closer to the mouthparts, and the metasomal terga are uniform, lacking a striate posterior section. *Chaetotrichella*, also with a one-segmented club (Doutt and Viggiani 1968, as *Brachista*), has a more ventrally placed foramen magnum, an elongate funicle, more complex genitalia, and an ovipositor which extends considerably beyond the apex of the metasoma.

*Doirania* can be separated unambiguously from other described oligositine genera. Yet it is probable that certain undescribed species, currently assignable to *Oligosita* based on antennal segmentation, are actually closer to *Doirania*. Unfortunately, these taxa are known only from females which makes their placement difficult at present. *Oligosita* is the largest genus of Trichogrammatidae and it is likely that it is composed of two or more unrelated lineages which simply lack certain derived features of other oligositine genera. A detailed analysis of the entire tribe is required before generic limits are satisfactorily clarified.

#### KEY TO SPECIES OF *DOIRANIA*

(Traits pertain to females unless indicated)

1. Ovipositor elongate,  $\frac{1}{4}$ – $\frac{1}{3}$  longer than hind tibia, extending slightly beyond cerci (Fig. 9). Male genitalia elongate, ca.  $\frac{1}{5}$  longer than hind tibia, with apodemes curving laterally at base (Fig. 17). Forewings with a small but distinct fumate cloud near apex of stigma. Known from Papua New Guinea and Ambon, Indonesia . . . . . *D. leefmansii*
- Ovipositor shorter, its length ranging from distinctly less than to subequal to hind tibial length, not quite attaining level of cerci (Fig. 8). Male genitalia shorter, length only 0.5–0.6 that of hind tibia, with apodemes straight, not curving laterally at base (Fig. 16). Forewing (Fig. 15) at most slightly darkened at apex of stigma, without a distinct fumate cloud . . . . . 2
2. Metasomal terga with longitudinally striate posterior section distinct, at least second and third visible terga with striate section ca. twice the length of uniformly sclerotized anterior



Figs. 1–6. 1, *Doirania elegans*, posterior view of head. 2, *Epoligosita* sp. (same). 3, *Doirania elegans*, right maxillary palp (ventral). 4, *D. elegans*, antenna (lateral). 5, *D. elegans*, sensilla on dorsum of forewing disk anterior to retinaculum (see arrow in Fig. 15 for location). 6, *D. leefnansi* (same).

section (Fig. 13). Male club distinctly longer than scape. New World . . . . . *D. elegans*, new species  
 – Metasomal terga with longitudinally striate posterior section relatively indistinct, sclerotized striae poorly distinguished from adjacent membrane, terga with striate section, at most, subequal in length to uniformly sclerotized anterior section (Fig. 14). Male club shorter than scape. Palearctic . . . . . *D. longiclavata*

***Doirania elegans* Pinto, new species**  
 (Figs. 1, 3–5, 7, 8, 11–13, 15, 16)

Two forms (A & B) of this species are recognized (see Variation). The description is based on North American specimens of Form A. Unless indicated, quantitative data are based on five specimens from different locales; data represent means unless reported as a range.

**Description.**—Female: Body length 0.44–0.75 mm. Medium to dark brown in color except face, legs and antenna lighter brown; forewing only slightly fumate beneath venation. **Head:** Antenna (Fig. 4) with toruli at level of ventral margin of eyes; scape and pedicel together 1.2× combined length of funicle and club; club 1-segmented; mean length/width of antennal segments as follows: scape, 2.76; pedicel, 1.95; funicle, 0.67; club, 2.24; relative length of antennal segments in same order: 47/37/14/56; club 1.2× as long as scape, with terminal sensillum (= UPP trichodea D of Olson and Andow 1993) setiform (see Variation), 0.45 segment length (Fig. 11), placed on a small apical truncate pedestal; longest flagelliform setae (= MPP trichodea

A) 0.65 club length. Maxillary palp narrowing asymmetrically to apex, with apical sensillum longer than half the length of adjacent seta (Fig. 3). *Mesosoma*: Propodeum transverse (Fig. 7), slightly arcuate at middle and slightly longer ( $<2\times$ ) than metanotum. Hind femur ca. 0.3 as wide as long; tarsi relatively short, pro-, meso- and metatarsi ca. 0.80, 0.75 and 0.75 the length of their respective tibia; segment I slightly shorter than II and III on fore- and middle legs, all tarsomeres subequal on hind legs. Forewing (Fig. 15) 2.5–3.0 $\times$  as wide as long, longest fringe setae 0.4–0.5 maximum wing width; sensilla anterior to retinaculum on dorsal surface of disk relatively large, digitiform, usually clavate (Fig. 5). Hind wing with 2 complete tracks of setae on disk, a partial third track present at apex in some specimens. *Metasoma*: Terga anterior to VII clearly differentiated into an anterior, uniformly sclerotized section and a posterior longitudinally striate section; striate section elongate, twice as long as anterior section on most terga (Fig. 13). Venter (Fig. 8) with all visible sterna except hypogynium narrowly divided longitudinally; hypogynium broadly emarginate; first visible sternum with a distinct posterior longitudinally striate section, others obsolescently striate posteriorly. Ovipositor 0.76 (0.67–0.89,  $n = 10$ ) as long as hind tibia (see Variation).

Male: As in female except antennal club with only 3 placoid sensilla (1 basal, 2 near apex), and fewer flagelliform setae; club longer than scape (1.1–1.4 as long); only anterior 3 metasomal terga with an obvious posterior striate section. Venter with a medial, posteriorly projecting lobe on antepenultimate sternum (as in Fig. 10, see Remarks); lobe only slightly longer than wide. Genitalia (Fig. 16) gradually but distinctly widened to apex, length 0.5–0.6 that of hind tibia, with basal apodemes straight, not curved laterally.

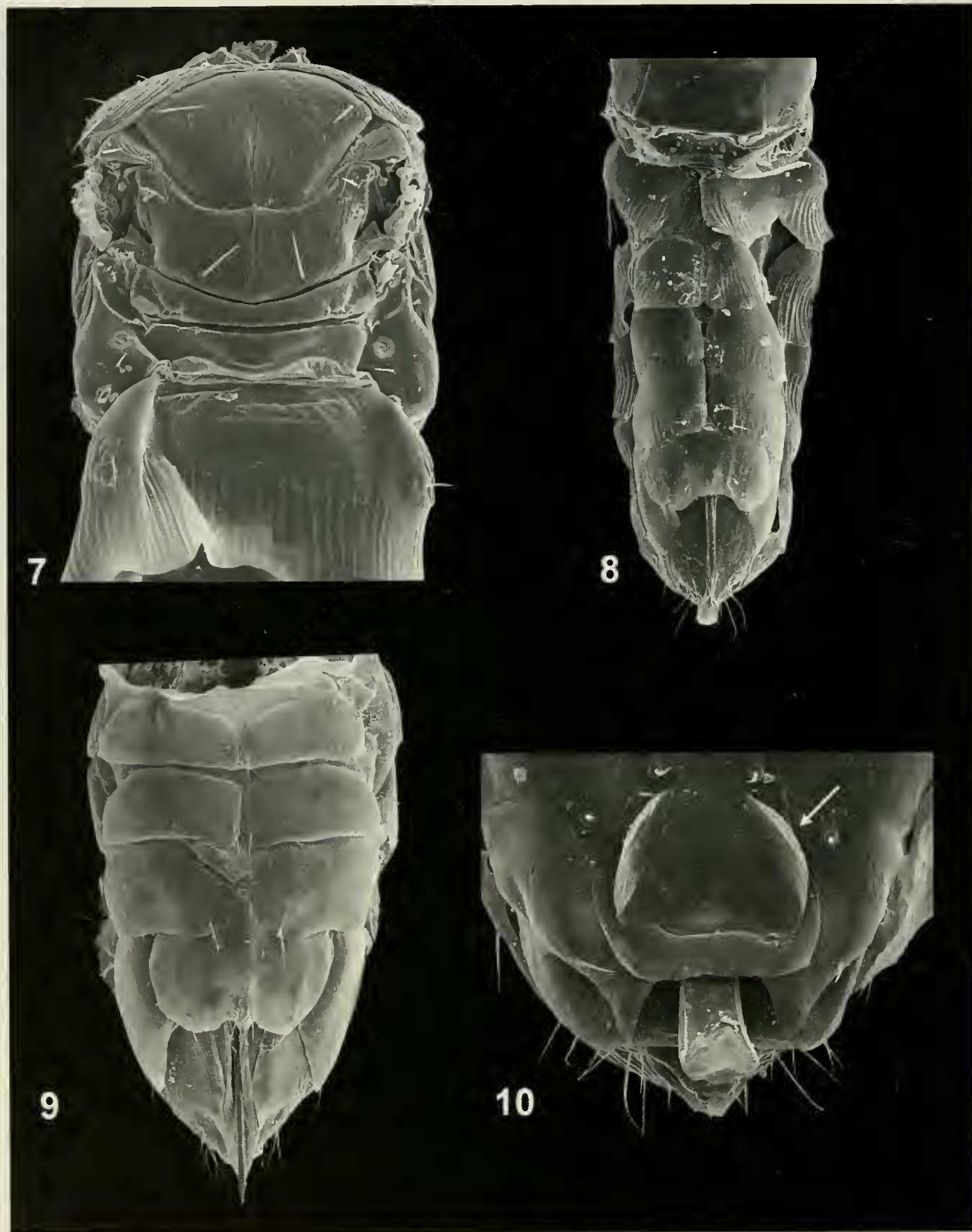
Variation.—There appears to be two sympatric forms (A & B) of this species. The description and types refer to Form A.

In Form A the terminal club sensillum in females is setiform (Fig. 11) and is similar in dimensions to the numerous flagelliform setae on the same segment; also the ovipositor is relatively short (see above). In Form B, the terminal sensillum is broader and, although tapering, it remains slightly truncate at the apex rather than acuminate (Fig. 12). Also the ovipositor is longer in Form B [0.98 (0.87–1.14,  $n = 12$ ) as long as hind tibia], and the discal forewing setae are usually shorter. I am unable to distinguish the males of these variants. Although the two forms are not geographically disjunct there is a degree of character overlap. Additional material and study is required to determine if this variation is taxonomically significant.

A small series from Ecuador (Limoncocha, Napo Province) consisting only of females is questionably conspecific to *D. elegans*. In these specimens the propodeum is more distinctly produced at the middle, and the pedicel is subequal in length to the scape. Ovipositor length and the form of the terminal club sensillum are as in Form A.

Types.—Holotype ♀. UNITED STATES. *Oklahoma*: Red Oak (Latimer Co.); ix-1993; flight intercept trap (FIT); K. Stephen. Paratypes, 2 ♂, 1 ♀ with same data. Holotype and one male paratype deposited in Canadian National Collection, Ottawa (CNC); the two additional paratypes deposited in the Entomology Department, University of California, Riverside. Types are mounted in Canadian balsam on glass slides. Seven carded females from the same series are not designated as types. The slide-mounted types belong to Form A.

Diagnosis.—*Doirania elegans* is closest to the Palearctic species, *D. longiclavata*. It is separated by the more distinct and longer striate section of the metasomal terga (see key to spp.). Also, in the male of *D. elegans* the club is distinctly longer than the scape, not shorter as in *D. longiclavata*. Sensilla anterior to the retinaculum on the dorsal surface of the forewing apparently provide an additional difference. In the new



Figs. 7–10. *Doirania*. 7, *D. elegans*, mesosoma (dorsal). 8, *D. elegans*, metasoma (ventral). 9, *D. leefmansi*, metasoma (ventral). 10, *D. leefmansi*, apex of metasoma (ventral).

species they are rather elongate, digitiform and often clavate (Fig. 5); in *D. longiclavata*, as in *D. leefmansi* as well, they are shorter and typically acuminate apically (Fig. 6). Ovipositor length and shape of the apical antennal sensilla in females of *D.*

*longiclavata* resemble Form A of *D. elegans*.

Although very similar phenetically, it is not yet clear if *D. elegans* and *D. longiclavata* are sister species. The only similarity which may be derived is the asymmetrically

narrowed maxillary palp (Fig. 3). It occurs in both species but not in *D. leefmansii*.

Geographic distribution.—Eastern United States, Arizona, southeastern Canada, with a single record of questionable conspecifics from Ecuador.

Remarks.—Hosts are unknown. Several of the records (see below) suggest that *D. elegans* occurs in relatively mesic habitats.

Males of *Doirania* and of related genera are characterized by at least one medial prolongation on the sternal region of the metasoma (Pinto and Viggiani, in preparation). The few males available of *D. elegans* and *D. longiclavata* are mounted on slides and do not allow adequate description of this structure. However, it appears to be similar to that occurring in *D. leefmansii* (Fig. 10).

Material examined.—136 ♀, 8 ♂. Identification of 'form' (A or B) is possible for slide-mounted females only. Consequently an indication of 'A' or/and 'B' does not follow those records based only on males or carded females. In cases where both slide-mounted and carded females are available, the number of individuals that identification of 'form' is based on is indicated (e.g., A/2, signifies that two of the females in the series were slide-mounted and identifiable to form).

CANADA. *Ontario*: Ottawa (Innes Point); viii-20/27-1985; 1 ♀; L. Dumochel/J. Denis (B). Powell's Lake (105 km NE Lake Superior); viii-16-1980; 1 ♀; M. Kaulbars. Shirley's Bay; viii-27/ix-10-1985; 1 ♀; M. Sanborne/H. Goulet. UNITED STATES. *Arizona*: Brawley Wash (Pima Co.); viii-3-1982; 1 ♀; G. Gibson (A). Nogales (N edge of town); ix-27-1985; sweeping; 1 ♀; J. Pinto (A). *Florida*: Archbold Biological Research Station; x-27/xi-30-1988; Malaise trap; 2 ♀; D. Wahl (A/1). Bradenton; x-19/26-1985; sweep; 1 ♀; C. Yoshimoto. Everglades National Park (Long Pine Key); vi-6/viii-26, & viii/xi-986; Malaise/flight intercept trap; 6 ♀; S. & J. Peck (A). Gainesville; iv-17/23-1988; 1 (sex undetermined); D. Wahl. Gainesville; iv-8/14-1987, xii-1/7-1986; 2 ♀; W. Mason.

Highlands Hammock (Highlands Co.); ix-18-1987; sweep; 2 ♀; L. Masner (A/1). *Georgia*: Athens (Whitehall Forest); ix-14/28-1987; flight intercept trap, hardwood forest (beaver swamp); 1 ♀; CNC Hym. Team (A). Sapelo Island; vii-18/ix-11-1987, ix-9/21-1987, x-15/xi-16-1987; Malaise trap; live oak forest; 14 ♀, 1 ♂; CNC Hym. Team (A/4). Tifton, 13 km NW; ix-25/x-17-1985; pan trap; 2 ♀; M. Keller (A/1). *Illinois*: Centralia (along roadside: Hwy 51 & Bethel Rd.); yellow pan trap "among weeds nr. soybeans"; ix-12/17-1995; 2 ♀; S. Triapitsyn (A). Centralia, 3 mi N; ix-12/17-1995; yellow pan trap "in grass nr. pond"; 1 ♀; S. Triapitsyn. Centralia, 2 mi S (of downtown); ix-13/17-1995; yellow pan trap "on edge of forest"; 1 ♀; S. Triapitsyn. Centralia, 8 mi E; ix-7-1993; sweeping "open field"; 2 ♀; J. Pinto. Litchfield; x-3-1983; sweep; 1 ♀, 1 ♂; J./D. Huber (A). Marion Co. (Myers Rd. nr. hwy. 57 & 161); ix-12/17-1995; yellow pan trap "in grass in swampy area"; 1 ♀, 1 ♂; S. Triapitsyn. *Kansas*: Manhattan, 2 mi S; ix-6-1983; 1 (sex undetermined); J./D. Huber. Wauconda Lake (2 mi W Glen Elder, Mitchell Co.); viii-28-1985; sweep; 1 ♀; J. Pinto. *Maryland*: Port Republic; viii/ix-1986; flight intercept trap; 9 ♀, 1 ♂; M. Sharkey/Munroe (B/1). Prince Frederick, 7 km S; v-7/vii-7-1987; 1 ♀; CNC Hym. Team. *Missouri*: Columbia (Hinkston Creek); ix-8-1987; sweep; 1 ♀; J. Pinto. Williamsville (Wayne Co.); vii-16/viii-8-1988, viii-1987, viii-8/31-1988, ix-1/20-1988, ix-10/26-1987, ix-20/x-20-1988, x-21/xi-11-1987; Malaise trap; 38 ♀, 2 ♂; J. Becker (A/3, B/5). *Nebraska*: Odessa, 6.8 mi E; viii-29-1983; 2 ♀; J. Pinto (A). *Oklahoma*: Red Oak (Latimer Co.); 9 ♀, 2 ♂; (see Types). *North Carolina*: Whiteside Mtn. (Jackson Co.); ix-13-1987; sweep; 3 ♀; L. Masner (B/1). *South Carolina*: Francis Beidler Forest (nr. Harleyville); ix-22-1987; sweep; 1 ♀; L. Masner (A). Francis Beidler Forest (10 km NE Harleyville); v-26/vi-11-1987; flight intercept trap; "bald cypress swamp"; 1 ♀. Pendleton (Tangle-

wood Springs; 34°38.7'S, 82°47.1'W; 225 m); vii-30/viii-20-1987, ix-1/9-1987, ix-15/30-1987, x-16/xi-3-1987; Malaise trap; 6 ♀; J. Morse (A/1). Pendleton (225 m); vii-15/22-1987, vii-29/viii-5-1987; Malaise trap; 2 ♀; CNC Hym. Team (A/1). *South Dakota*: Pickstown (Charles Mix Co.); viii-26-1985; "sweeping riparian"; 4 ♀; J. Pinto (A/1, B/1). *Texas*: Ben Bolt, 8 mi NW (La Copita Res. Stn.); ix-28/30-1990; Malaise trap; 1 ♀; R. Wharton/J. Woolley. Clymer Meadow (Hunt Co.); vii-9-1991; sweep; 1 ♀; J. Woolley (A). College Station; viii-26-1987; 1 ♀; J. Woolley/G. Zolnerowich (B). College Station (Lick Creek Park); vii-30-1987; sweep; 1 ♀; J. Woolley. College Station (Lick Creek Park); x-16/xi-17-1987; sweep; 1 ♀; J. Woolley/J. Heraty. Hallsville, 2 mi W; iv-27-1984; sweep "roadside forbs"; 1 ♀; W. Ewart (B). Hearne, 8 mi. E.; x-22/27/1990; Malaise trap; 1 ♀, 1 ♂; J. Woolley, et al. Park Hill Prairie (Collin Co.); vii-9-1991; 2 ♀; J. Woolley (B/1). *Virginia*: Blacksburg, 8 km NW (1000 m); vi-9/19-1987, vi-19/30-1987, vii-13/19-1987; Malaise trap; 6 ♀; CNC Hym. Team (A/2).

*Doirania longiclavata* Yashiro  
(Fig. 14)

*Doirania longiclavata* Yashiro 1980: 131.

Diagnosis.—Similar to *D. elegans* except for the more poorly defined striate section of the metasomal terga (cf. Figs. 13, 14), the smaller club/scape ratio in males, and the differently shaped sensilla at the base of the forewing (cf. Figs. 5, 6).

Types.—Holotype ♀, from JAPAN, "Hatadera, Matsuyama City, Ehime Pref., Shikoku"; x-19-1977; N. Yashiro; "on turfs"; presumably in the Entomological Laboratory, University of Osaka Prefecture (inquiries regarding the holotype were unanswered).

Geographic distribution.—Previously recorded only from Japan, but probably widespread in Palaearctic. Currently known from Japan, eastern Russia, and France.

Material examined.—FRANCE. *Dept. Gironde*: St. Colombe (nr. Castillon-la-Bataille), 44°54'N, 00°02'W; viii-17-2000; suction trap; 1 ♀; M. van Helden. JAPAN. *Kyushu*: Fukuoka (Mt. Tachibana); viii-26/31-1979; yellow pan traps, "primarily evergreen forest"; 4 ♀; K. Yamagishi. *Honshu*: Iwate (Mt. Hayachine); 400 m; viii-2/8-1989; Malaise trap; M. Sharkey. [Several additional Japanese records cited by Yoshiro 1980]. RUSSIA. *Primorskiy Krai*: Tsjvaza (30 mi NE Vladivostok); flight intercept trap "coastal forest"; viii-5-1992; 5 ♀, 1 ♂; B. Gill. *Krasnodarskiy Krai*: Krasnodar, nr. (All Russian Research Institute of Biological Plant Protection); viii-30/31-2001; yellow pan trap; 1 ♀; V. Kustjukov.

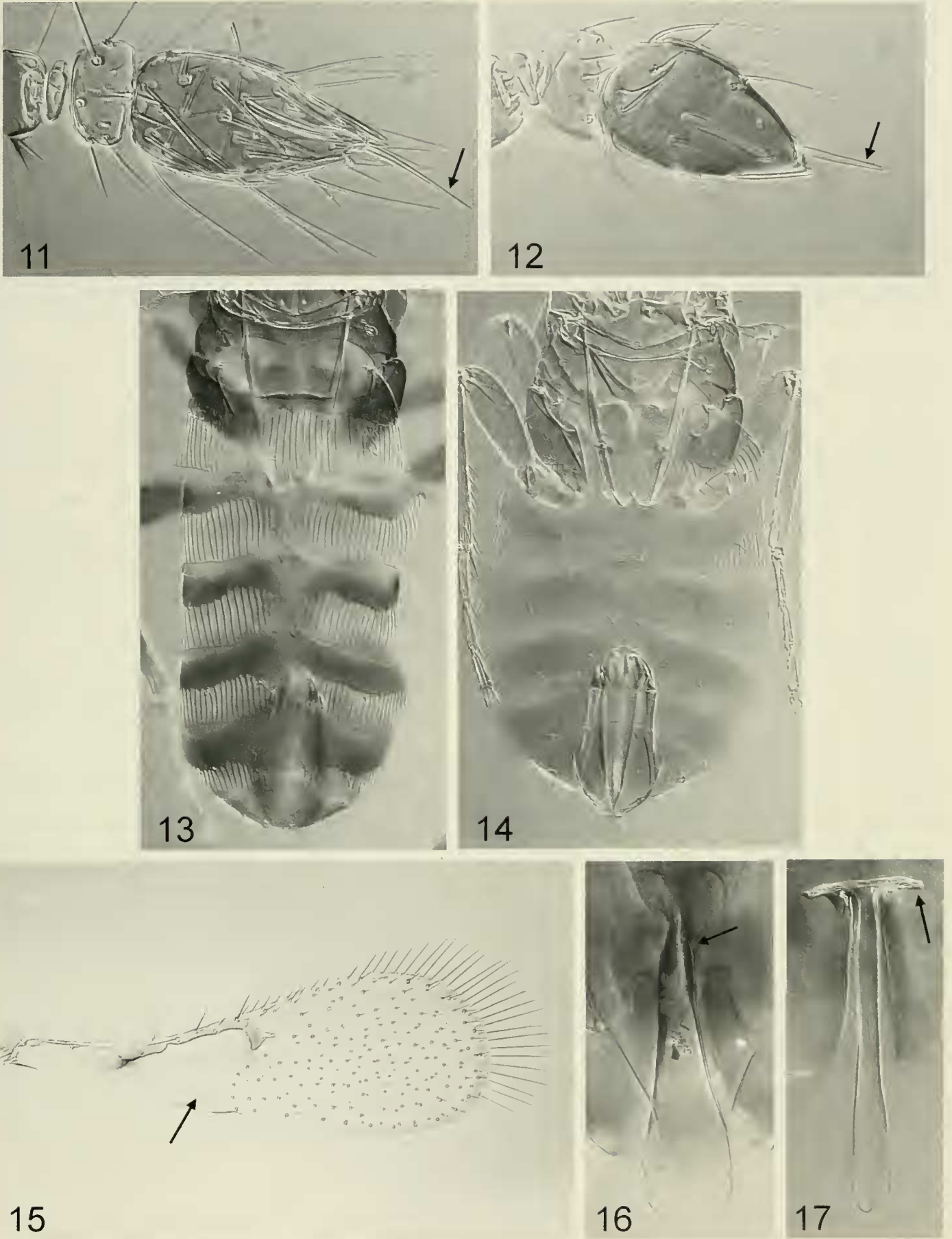
Remarks.—Hosts are unknown. As with *D. elegans*, *D. longiclavata* apparently frequents mesic habitats. Yashiro (1980) states that the species has been collected in "paddy fields and grassplots."

*Doirania leefmansii* Waterston  
(Figs. 6, 9, 10, 17)

*Doirania leefmansii* Waterston 1928: 286; Yashiro 1980: 133; Doutt and Viggiani 1968: 499; Viggiani 1971: 209; Caudwell 2000: 218.

Diagnosis.—Female. Body light brown in color. Antenna with scape subequal in length to club. Maxillary palp regular at apex, not narrowing asymmetrically. Forewing with a small fumate cloud directly behind stigma; sensilla anterior to retinaculum on dorsal surface of disk small, acuminate (Fig. 6). Ovipositor elongate, distinctly longer than hind tibia, extending beyond cerci (Fig. 9). Male. Antenna with scape also subequal to club. Genitalia elongate, ca. 1/5 longer than hind tibia, with basal apodemes directly laterally (Fig. 17).

Types.—Holotype ♀, "Ambon (D.E.I.)" (currently Indonesia) from "eggs of *Sexava coriacea*," iv-30-1925, S. Leefmans coll.; stated to be in The Natural History Museum, London (Waterston 1928) but not lo-



Figs. 11–17. *Doirania*. 11, *D. elegans*, antenna (Form A) (arrow at apical sensillum). 12, *D. elegans*, antenna (same, Form B). 13, *D. elegans*, metasoma (dorsal). 14, *D. longiclavata*, (same). 15, *D. elegans*, forewing (arrow at location of disk sensillae; see Figs. 5, 6). 16, *D. elegans*, male genitalia (venter, arrow at basal apodemes). 17, *D. leefmansii* (same).



cated (4 ♀ paratypes with same data as holotype examined).

Geographic distribution.—Known from Indonesia (Ambon) and Papua New Guinea.

Material examined.—INDONESIA: Ambon (see Types). PAPUA NEW GUINEA: Dami, West New Britain; ix-29-1991; T. M. Solulu; 11 ♀, 1 ♂. New Hanover [Isl.]; 1932; 'ex. eggs of locustid'; J. L. Froggatt; 1 ♀. Culture material reared in Papua New Guinea, of unknown origin, 10 ♀, 1 ♂.

Remarks.—*Doirania leafmansi* is known to attack eggs of species of Tettigoniidae (*Segestes* spp.), pests of oil palm, in Papua New Guinea. Although their role in affecting pest populations is questionable, these wasps continue to be cultured and released into oil palm growing areas (Caudwell 2000).

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